

REMARKS

The present response is intended to be fully responsive to all points of objection and/or rejection raised by the Examiner and is believed to place the application in condition for allowance. Favorable reconsideration and allowance of the application is respectfully requested.

Applicants assert that the present invention is new, non-obvious and useful. Prompt consideration and allowance of the claims is respectfully requested.

Status of Claims

Claims 1 – 39 are pending in the application. Claims 1 – 39 have been rejected. Claim 27 has been amended.

Remarks to the Declaration

In the Office Action, the Examiner objected to the declaration because it did not use the term "material to the patentability of this application".

Applicants attach hereto a supplemental Declaration. Accordingly Applicants request that the Examiner withdraw the objection.

CLAIM REJECTIONS

35 U.S.C. § 101 Rejections

In the Office Action, the Examiner rejected claims 27-30 under 35 U.S.C. 101, "because the term 'data structure' may be interpreted as non-functional descriptive matter that is not contained on a medium with which to realize the functionality that is claimed."

Claim 27 has been amended to recite --A speech recognition system having a data structure-- rather than "A data structure". Moreover, the claim now recites that the states are ---to be processed by said speech recognition system--. Thus, claim 27 now "defines structural and functional interrelationships between the data structure and other claimed

aspects of the invention which permit the data structure's functionality to be realized." (from MPEP 2106.01)

Accordingly, Applicants respectfully request that the rejection of claims 27 – 30 be withdrawn.

35 U.S.C. § 102 Rejections

In the Office Action, the Examiner rejected claims 1-6, 8-14, 16, 27-36 and 39 under 35 U.S.C. 102(b), as being anticipated by Tzirkel-Hancock et al. (US Patent Pub. 2002/0032566).

Applicants respectfully traverse this rejection in view of the remarks that follow.

The present specification attempts to reduce the search space (or number of states to be processed) for a particular time frame, by maintaining a list of states to be processed in an "active range". This is discussed in the following paragraphs of the specification:

"[0024] ... there may be one, or more ranges per reference word and thus, a limited number of checks may be made to determine which states are to be processed for each word.

"[0036] ... In accordance with one preferred embodiment of the present invention, the start state *js* may be defined by finding the first state from the beginning of the word which is active. Thus, for word 3, start state *js* is state 14. The end state *je* may be defined by finding the first state from the end of the word which either is active or has an active state within its lookbehind range.

"[0037] ... Thus, despite having some inactive states, all states of word 2 remain within the active range.

"[0040] Active range Viterbi calculator 18 may access active range buffer 26 to determine the current active range to be processed, may access state buffer 28 to retrieve the states within the current active range and may perform the Viterbi calculations on all states within the active range. In addition, Viterbi calculator 18 may access lookbehind buffer 31 for a listing of those states whose lookbehinds are greater than 1."

The “active range” recited in the independent claims of the present invention is different than the list of active states mentioned in paragraph 142 of Tzirkel-Hancock. Moreover, in paragraph 145, Tzirkel-Hancock recites: “... the system then checks to see if there are any active states in the current active list 203. In other words, a check is made to see if there are any valid paths ending in the current word for the current frame f_k .” Tzirkel-Hancock processes only those states that are actually active in a particular time frame.

Unfortunately, as discussed in the present specification (see paragraphs [0009] and [0020]), maintaining and/or checking a list of active states may become computationally expensive. Claims 1 and 9 recite a speech recognition system with a simpler data structure, the “active range”, which does not hold a list of active states, but points to a place(s) in the array of states where active states are to be found. The “range(s)” is defined by two indices into this array (pointing to start and end states).

Thus, despite the Examiner’s remarks to the contrary, Tzirkel-Hancock does not teach active ranges, nor does it teach “an active range storage unit to store a multiplicity of active ranges” as recited in claim 1, nor does it teach “said speech recognizer to determine a multiplicity of active ranges defining states to be processed for each frame” as recited in claim 9.

The speech recognizer recited in claim 9 performs “recognition operations for said frame only on states within said active ranges”. This approach generally reduces processing power by replacing the maintenance of a list of active states with the maintenance of active ranges.

Furthermore, claim 27 of the present application recites “a multiplicity of active ranges, each active range defining states to be processed in a current frame.” The arguments provided above hold for claim 27 as well. Tzirkel-Hancock teaches processing only a list of active states. It does not show nor teach processing active ranges “defining states to be processed in a current frame”.

The Examiner pointed to Fig. 23 of Tzirel-Hancock as showing “valid paths” (paragraph 143) that have a starting and ending state associated with them. However, these valid paths are not “active ranges,” but rather historical chains of states. In any case, current active list 203 only comprises currently active states (i.e. the end states); it does not comprise “a beginning state of said active range” as recited in claim 27.

Regarding claim 31, as discussed above, Tzirkel-Hancock does not teach “determining active ranges” because it teaches using a list of active states. Furthermore, as discussed above, it does not teach “performing recognition operations for each said frame only on states within said active ranges” because it teaches away from recognition operations on any states not included in currently active list 203 (see paragraph 145). The present specification allows inactive states to be included within active ranges.

Accordingly, Applicants respectfully request that the rejection of independent claims 1, 9, 27, and 31 be withdrawn. Applicants also request that the rejection of dependent claims 2 – 6, 8, 10 – 14, 16, 28 – 30, 32 – 36 and 39 be similarly withdrawn.

In the Office Action, the Examiner rejected claims 17 and 22 under 35 U.S.C. 102(b), as being anticipated by Robinson (US 5,983,180).

Robinson teaches “recognition of sequential data using finite state sequence models organized in a tree structure” (Title), which recognition includes pruning of the tree structure.

Robinson clearly teaches traversing all states in the model (which he terms “nodes”). When describing Fig. 13, Robinson states “... in step S5 it is determined whether all of the nodes in all of the trees have been processed and if not in step S7 the next phoneme is pointed to in order to initiate the process node routine for the next tree structure. When all of the nodes of all of the trees have been processed ...” (col. 11, lines 51 – 56)

Robinson teaches pruning with respect to Figs. 15 and 16. Quoting Col. 12, lines 56-62: "... pruning is defined as the time range over which a particular node in the tree is active. Typically both the start time and the end time of this range will increase by the average phoneme duration and indeed the start time must increase by at least the minimum duration of the phoneme (1 frame in these examples). The function of the pruning algorithm is to make this time range as small as possible such that it contains the best possible path."

The pruning Robinson describes for Figs. 15 and 16 is done for each node (equivalent to a state), and determines the time range when this state is active. Claims 17 and 22 recite performing operations on a range of states rather than on time range ("only on states within said active ranges").

Accordingly, Applicants respectfully request that the rejection of independent claims 17 and 22 be withdrawn.

35 U.S.C. § 103 Rejections

In the Office Action, the Examiner rejected claims 7, 15 and 37 – 38 under 35 U.S.C. 103(a), as being unpatentable over Tzirkel-Hancock et al. as applied to claims 1, 9 and 31 above, and further in view of Robinson.

In the Office Action, the Examiner rejected claims 18 – 21 and 23 – 26 under 35 U.S.C. 103(a), as being unpatentable over Robinson as applied to claims 17 and 22 above, and further in view of Tzirkel-Hancock et al.

The combination of Tzirkel-Hancock and Robinson does not teach or suggest all the limitations of independent claims 1, 9, 31, 17 and 22, nor does it teach or suggest all the limitations of dependent claims 7, 15, 18 – 21, 23 - 26 and 37 - 38. Both Tzirkel-Hancock and Robinson have been discussed above. That discussion is applicable here. Neither Tzirkel-Hancock nor Robinson discuss "active ranges" and therefore cannot cure each other's deficiencies. Accordingly, Applicants respectfully assert that these rejections should be withdrawn.

In view of the foregoing amendments and remarks, the pending claims are deemed to be allowable. Their favorable reconsideration and allowance is respectfully requested.

Should the Examiner have any question or comment as to the form, content or entry of this Amendment, the Examiner is requested to contact the undersigned at the telephone number below. Similarly, if there are any further issues yet to be resolved to advance the prosecution of this application to issue, the Examiner is requested to telephone the undersigned counsel.

Petition For Three-Month Extension Of Time Under 37 CFR 1.136(a)

The period for responding to the instant Notice was set to expire on August 8, 2007. Applicant hereby requests that the period for responding to the instant Office Action be extended by three (3) months, so as to expire on November 8, 2007. Accordingly, this response is being timely filed.

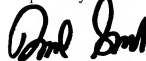
The fee for a Petition for a Three-Month Extension of Time is Five Hundred and Twenty-Five Dollars (\$525.00) dollars for a small entity, for which a credit card payment is included herewith. The United States Patent and Trademark Office is hereby authorized to charge Deposit Account 501380 for payment of any additional fee which is necessary in connection with the filing of this response and petition.

Favorable action on this response is courteously solicited.

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